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On Two Spider Mites Parasitic on Japanese Citrus*

With 11 Text-figures

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(*Communicated by* T. UCHIDA)

Recently, through the courtesy of Mr. Shizuo Kato, Chief of the Division of Entomology, National Institute of Agricultural Sciences, Tokyo, the author had an opportunity to examine some specimens of an unfamiliar spider mite, which were collected on citrus from the Island Ôsaki-shimojima in the Inland Sea. On examination, the mite seems to belong to a new species of the genus *Eotetranychus*. Together with this new species another spider mite also injuring the citrus has been treated, because the latter stands in a complicated state in view of the scientific name.

Before going further, the author wishes to express his sincere gratitude to Professor Tohru Uchida for his helpful guidance. Thanks are also due to Messrs. Shizuo Kato, Jinhaku Minamikawa, Jirô Fukuda, Toshio Miyake and Norizumi Shinkaji for obtaining the material. Furthermore, the author is very grateful to Drs. Edward W. Baker and A. Earl Pritchard who kindly made valuable suggestions.

Eotetranychus kankitus n. sp.

(Figs. 1—8)

? *Tetranychus sexmaculatus* (nec Riley); Yago, *Control Method Agr. Ins. Pests*, p. 375, 1935.

Female. Body from above oval, 250 to 380μ long and 160 to 250μ wide in widest part. Colour whitish yellow in specimens preserved in alcohol. Distal segment of palpus wider than long; terminal sensillum more than twice as long as wide; dorsal sensillum rather spindle-shaped, about four times as long as broad, distinctly shorter than terminal sensillum; 5 additional setae borne on "thumb". Mandibular plate (ratio of length to breadth, 10:7), rounded in front but sometimes notched slightly. Relative lengths of segments in leg I as follows: Trochanter, 10; femur, 24; patella, 12; tibia, 13; tarsus (empodium exclusive), 21. Tarsus I dorsally provided with 2 proximate sets of duplex setae;

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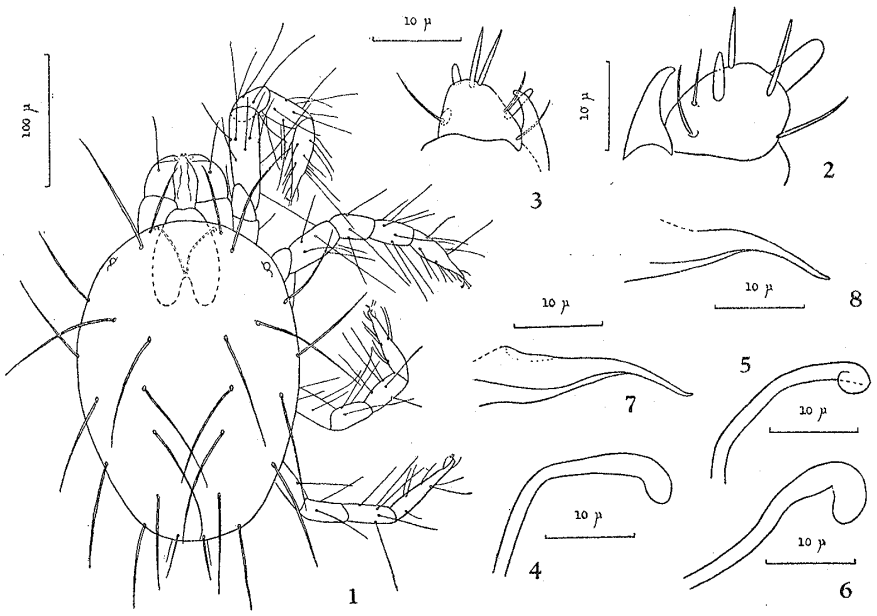
6 setae borne proximad of proximal set of duplex setae; proximal duplex setae of tarsus I with proximal member about two-sevenths as long as distal member; distal duplex setae of tarsus I with proximal member about one-fifth as long as distal member. Empodium normally consisting of 3 pairs of hairs; 4 tenent hairs arising from onychium as usual in two pairs, each present on a side of claw base. A pair of eyes, one perfect and one imperfect, present on each side. Peritreme slender, distally dilated in tobacco-pipe-shape, the terminal chamber



Figs. 1-8. *Eotetranychus kankitus* n. sp.
1. Dorsal view of female. 2. Distal part of palpus of female. 3. Distal part of palpus of male. 4-6. Dorsal view of peritreme of female (partly shown). 7-8. Aedeagus.

alone being visible. Dorsum of body with transverse striae not only between the inner sacral and inner lumbar setae, but also in the area between these setae. Dorsal setae not arising from tubercles, slender, tapering, finely pubescent, and much longer than intervals between their neighbouring bases; clunal setae present.

Male. Body from above sagittate in outline, 240μ long and 150μ wide in widest part. Terminal sensillum of palpus much longer than broad, gradually narrowing from base to apex; dorsal sensillum very slender, much longer than terminal sensillum. Middle pair of digits of empodium I stouter than other two pairs. The aedeagus is as given in Figs. 7-8: shaft rapidly narrowing distally in the middle part where it is bent downward about 45°. The distal half of shaft is gradually acuminated to a sharp tip.

Holotype. 1♂, Hisatomo-mura, on the Island Ôsaki-shimojima (Hiroshima Pref.) located in the central part of the Inland Sea, 22. VI, 1954 (on citrus), T. Miyake leg.

Allotype. 1♀, 27. IX, 1954, locality, host and collector same as in the holo-

type.

Paratypes. 1♂ & 4♀♀, 22. VI, 1954, 1♂ & 6♀♀, 27. IX, 1954, locality, host and collector same as in the holotype.

The types are deposited in the Zoological Institute, Faculty of Science, Hokkaido University.

Host and Distribution. Japan (the Island Ôsaki-shimojima), collected on citrus.

Remarks. The new mite, though closely allied to *Eotetranychus sexmaculatus* (Riley) and *E. lewisi* (McGregor) of U.S.A. and also to *Tetranychus talisiae* Hirst* of Europe, is characterized in the terminal sensillum of male palpus which is well developed and much longer than broad. Moreover, the new species is different from *E. sexmaculatus* in the relative lengths of segments of leg I (McGregor, 1950), and from *E. lewisi* in the dorsal sensillum of the female palpus which is much shorter than the terminal sensillum. The new species is named after "kankitsu" which means citrus in Japanese.

Metatetranychus citri (McGregor)

(Figs. 9–11)

Tetranychus (*Paratetranychus*) *citri*; McGregor, Ann. Ent. Soc. Amer., 9:284, pl. 14, Figs. 1–9, 1916.

Tetranychus mytilaspidis (nec Riley); Banks, U.S. Dept. Agr. Div. Ent., Tech. Ser., Bull. 8: 71, 1900; anonymous, *Ann. Rep. Shizuoka-ken Agr. Exp. Sta.*, 1918, p. 115, 1918; ———, *Life History & Control Tea Spider Mite & Citrus Spider Mite* (*Jap.*), (publ. by Shizuoka-ken Agr. Exp. Sta.), p. 1, 1924; ———, J. Plant Protect., 12: 468, 1925; Esaki, Myriapoda & Arachnida, p. 74, 1932; Yago, *Control Method Agr. Ins. Pests*, p. 375, 1935; Okabe & Yago, *Colour Illustr. Fruit Tree Ins. Pests* (*Jap.*), p. 26, pl. 16, 1937; Y. Takahashi, *Pract. Control Agr. Ins. Pests*, p. 228, 1948; Ishii, *Textb. Agr. Ent.*, p. 345, 1949; Sakai, *Biol. Control Agr. Pests*, *Fruit Tree Pests* (edited by Yuasa & Asuyama), p. 362, Fig. 19, 1950; Takimoto & Y. Takahashi, *Vadem. Biol. Control Agr. Pests*, p. 291, 1952.

Tetranychus sp.; Sasaki, *Textb. Fruit Tree Ins. Pests*, 1st Ed., p. 176, Fig. 53 b, 1905; ———, Ibid., New Ser., 1st Ed., p. 181, Fig. 56, 1921; ———, *Textb. Hortic. Ins. Pests*, p. 79, Fig. 43, 1910; Tanaka, Chiuo Engei, no. 368, pl. 3, 1933.

Paratetranychus citri; McGregor, Proc. U.S. Nat. Mus., 56: 672, pl. 79, Fig. 15, 1919; Mabry & Walton, Ins. Pest Surv. Bull., 19: 589, 1939; McGregor, Amer. Midl. Nat., 44: 235, Fig. 15, 1950; Matsumoto, *Introd. Biol. Control Fruit Tree Ins. Pests*, 1st Ed., p. 138, 1950; Fukuda, *Control Fruit Tree Ins. Pests*, 1st Ed., p. 122, 1951.

Tetranychus sp. (partimr?); S. Takahashi, *Textb. Fruit Tree Ins. Pests*, vol. 2, p. 1188, 1930; Yago & Furukori, J. Plant Protect., 24: 593, 1937; ———, Shizuoka-ken Agr. Exp. Sta., Bull. no. 43, p. 1. pls. 1, 2, 1937.

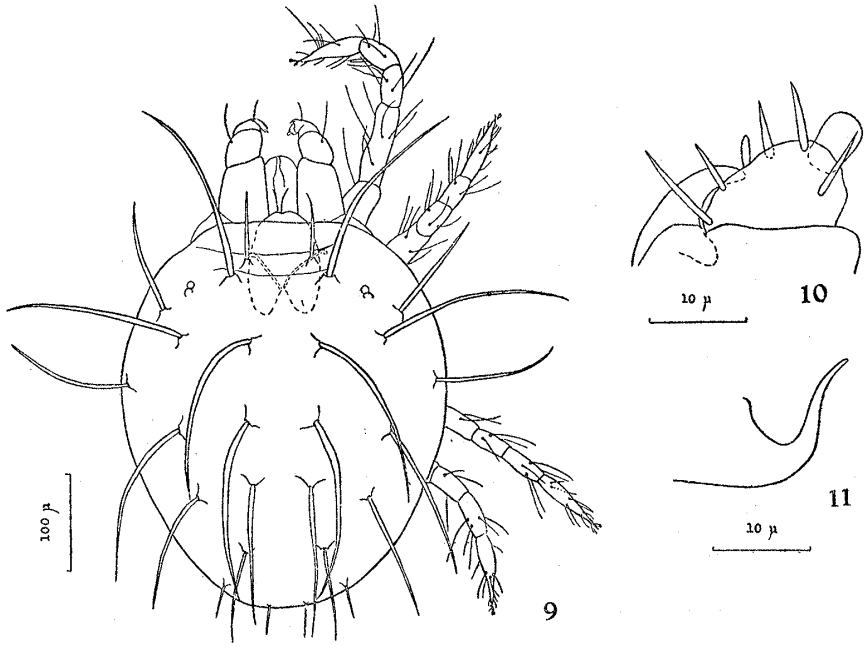
Paratetranychus pilosus (partimr?) (nec C. & F.); Yago, Ishii's "*Control Method Hortic. Pests*," *Control Spider Mites Pear*, p. 171, Figs, 1938.

Metatetranychus citri; Baker & Wharton, Introd. Acarol., p. 214, 1952; Jeppson et al., J. Econ. Ent., 46: 10, 1953; Fukuda, *Control Fruit Tree Ins. Pests*, 2nd Ed., p. 122, 1953; Fukuda & Shinkaji, Hortic. Div. Nat. Tôkai-kinki Agr. Exp. Sta., Bull. no. 2, p.160, 1954; Shinkaji, Agric. & Hortic., 29: 1498, 1954.

* On *T. talisiae*, McGregor (1950) states as follows: "Although the writer has not seen specimens of *T. talisiae* Hirst, it is almost certain, on the basis of the description and figures, that this exotic mite is a synonym of *T. sexmaculatus* Riley."

? *Metatetranychus citri*; Seki, J. Hortic. Assoc. Jap., 23: 57, 1954.

Female. Body from above oval, 380 to 500μ long and 290 to 380μ wide in widest part. Colour velvety-red. Distal segment of palpus wider than long; terminal sensillum slightly spatulate and wide, much longer than broad; dorsal sensillum small and slender; 5 additional setae borne on "thumb". Mandibular plate (ratio of length to breadth, 10: 7.5) slightly emarginate mediodistally. Relative lengths of segments in leg I as follows: Trochanter, 12; femur, 32; patella, 16; tibia, 17; tarsus (empodial claw exclusive), 27. Tarsus I dorsally with 2 proximate sets of duplex setae; 4 setae borne proximad of proximal set of duplex setae; proximal duplex setae of tarsus I with proximal member about two-fifths as long as distal member; distal duplex setae of tarsus I with proximal member about two-elevenths as long as distal member. Empodial claw thick, with 3 pairs of proximoventral setae that surpass the claw, the proximal pair being the stoutest;



Figs. 9–11. *Metatetranychus citri.*
9. Dorsal view of female. 10. Distal part of palpus of female.
11. Aedeagus.

4 tenent hairs arising from onychium as usual in two pairs, each present on a side of claw base. One perfect and one imperfect eye present on each side. Peritreme slender, ending in a swollen chamber. Dorsal setae set on prominent, subconical tubercles, thick, stout, tapering, and much longer than intervals between their neighbouring bases.

Male. Body from above sagittate in outline, 290μ long and 190μ wide in widest part. Colour bright red. Terminal sensillum of palpus not spatulate, subequal in length to dorsal sensillum which is slender. Legs relatively long compared with those of female. The aedeagus is as in Fig. 11: shaft as long as thick in region of basilar lobe; hook directed upward, attenuate.

Specimens examined: Shimizu, Shizuoka Pref., 8♂♂ & 24♀♀ (on orange),

5♀♀ (on *Poncirus trifoliata*), 13. X, 1954, S. Ehara and N. Shinkaji leg.; Okitsu, Shizuoka Pref., 2♂♂ & 3♀♀ (on citrus trees in both field and hothouse), 5♀♀ (on pear), 13. X, 1954, S. Ehara and N. Shinkaji leg., 17♀♀ (on citrus bark), 14. II, 1952, J. Okudai leg.; Kihara, Mihara, Hiroshima Pref., 2♂♂ & 5♀♀ (on citrus trees), 9. X, 1954, T. Miyake leg.

Hosts. It is known that a number of plants belonging to various families harbor the present mite. Above all, the citrus is well known to be a favorite host. Yago and Furukori (1937) succeeded in breeding this mite from larva to mature adult with pear leaves. As listed above, the author was able to examine several specimens collected on pears in Shizuoka Pref., which were planted near the citrus trees.

Distribution. Japan (Honshu; Shikoku ? Kyushu ?); Bermuda, Canada, China, Formosa, Hawaii, New Zealand, North America, South America.

There has been found on the islands of Kyushu and Shikoku by some workers a mite probably identical with this species. Judging from the occurrence of the mite in South China and Formosa, it is probably widely distributed throughout southern Japan.

Remarks. In a report* of the Shizuoka-ken Agr. Exp. Sta., published in 1924, the Japanese mite was first described as *Tetranychus mytilaspidis* Riley; this name was still often applied erroneously in North America to the citrus red mite at that time. Most Japanese economic entomologists treating the mite have followed the above in accepting the name *T. mytilaspidis*, while several recent workers have correctly referred the mite to *Metatetranychus* (or *Paratetranychus*) *citri*. In 1905, a mite injuring the Japanese citrus was briefly described by Sasaki, without giving a specific name. Sasaki's mite, however, seems possibly to be the mite here treated. Incidentally, in the review of Mabry and Walton (1939) on distribution of the present mite they describe a record from "Japan".

The citrus red mite, *Metatetranychus citri*, is closely allied to *M. ulmi* (Koch), which is known also from this country (cf. Ehara, 1955). As is pointed out by McGregor (1916, 1919, 1950), *M. citri* is different from the latter in the shape of the aedeagus, of terminal sensillum of the female, and of femur I of the female. Recently, Fleschner (1952), who newly recorded this mite from China and Formosa, proposed the following opinion: "Since citrus is native to the Orient and is the preferred host of this mite, it seems quite logical to conclude that the citrus red mite is native to the Orient."

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* It was noted in this report that the scientific name was determined by some American acarologist through the intermediation of Mr. L.O. Howard.